PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:

Menon et al.

Application No.: 10/612,156

Confirmation No.: 4127

Filed: July 2, 2003

For: METHOD FOR EXCHANGING HIGHER LAYER SYSTEM INFORMATION ON A WIRELESS SYSTEM AND AUTOMATIC SYSTEM SELECTION OF A WIRELESS LANS

Group: 2616

Examiner: Christine T. Duong

Our File: I-2-0335.1US

Date: **September 10, 2007**

DECLARATION UNDER 37 C.F.R. § 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Narayan Menon, make the following declaration:

1.   I am a named inventor of the above-identified patent application and co-inventor of the subject matter described and claimed therein.
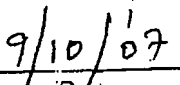
2. On April 16, 2002, which is prior to June 5, 2002, my co-inventors and I completed an invention entitled METHOD FOR EXCHANGING HIGHER LAYER SYSTEM INFORMATION ON A WIRELESS SYSTEM AND AUTOMATIC SYSTEM SELECTION OF A WIRELESS LANS (hereinafter "the present invention") as described and claimed in the above-identified patent application.

3.   On or before April 16, 2002, we prepared an Invention Disclosure Form and an Invention Disclosure describing the present invention. True and correct copies of the Invention Disclosure Form and the Invention Disclosure are attached hereto as Exhibit A.

4.   The above-identified Application claims priority from U.S. Provisional Application Serial No. 60/393,410, filed July 2, 2002. Due diligence was exercised from April 16, 2002 on which the Invention Disclosure Form was prepared up to the filing date of Provisional Application No. 60/393,410 and the subsequent filing of the present application based thereon.

The undersigned hereby declares that all statement made herein are based upon his own knowledge and are true and that the statements were made with the knowledge that willful false statements will be punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize of the validity of the application or any patent issued thereon.

_____   9/10/07 .
Narayan Menon   Date

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InterDigital® Communications Corporation

INVENTION DISCLOSURE FORM

Send to:
InterDigital Communications Corporation
Patent Administrator
781 Third Avenue
King of Prussia, PA 19406

This disclosure includes:
☒ IDC Inventor(s) Only
☐ IDC & Non-IDC Inventor(s)

Attachments? ☒ Yes ☐ No

INSTRUCTIONS

I. General

a. Title of the Invention: Higher level system information mechanism for wireless systems (re: WLAN Interworking SPD: item #39)

b. Answer all questions. Use N/A when not applicable. Attach separate pages when answering sections III through IV.

c. Sign and date each page and any additional pages that constitute the disclosure in ink. Write all given names in full when signing the Disclosure.

d. Two witnesses must sign and date every page of the INV Disclosure and accompanying papers using the signature block on the bottom of each page. The witness should have read the INV Disclosure and understood the disclosed material prior to signing and should be of such background that doubt of his comprehension is unlikely to be raised at a later date. A co-inventor should not be a witness.

1.

INVENTOR	CO-INVENTOR, IF ANY
PERSONAL INFO: Mr ☒Mrs.☐ Ms.☐ Dr.☐	PERSONAL INFO: Mr.☐ Mrs.☐ Ms.☐ Dr.☒
FULL NAME Narayan P. Menon	FULL NAME Prabhakar Chitrapu
Address 81 Wilson Ave.	Address 135 Brochant drive
North Babylon, NY 11702	Blue Bell, PA 19422
U.S.A.	
Citizen of India (US Permanent Resident)	Citizen of US
COMPANY INFORMATION	COMPANY INFORMATION
Name: InterDigital	Name:IDCC
Address: 2 Huntington Quadrangle (4th Floor), Melville, NY 11747	Address: KoP
Tel. No. (631) 622-4406	Tel. No. 610-878-5730

READ AND UNDERSTOOD BY:	
Inventor (1):	Witness #1
Inventor (2)	Witness #2
Date:	Date:

2.

WITNESS # 1	WITNESS # 2
Name	Name
Tel. No.	Tel. No.
Date	Date
Address	Address

II. Conception

a. When did you first begin to work on the invention? April 3, 2002

b. Did any work concerning the invention arise in the course of any contract? No
   if yes, identify:N/A

c. Is further development of your invention now in progress or scheduled? ☐YES ☒ NO

d. Has any aspect of this invention been published, been presented at a scientific meeting or otherwise disseminated? If yes, please identify and list dates (**Dates are important**) If published, list the date they are recorded on microfilm or in a library. No

e. Are there any plans to publish or otherwise disseminate any aspect of this invention in the future? ☐YES ☒NO If yes, please identify and list dates.

   NOTE: If the invention has not yet been published or otherwise disseminated, IDC patent counsel should be notify immediately of any contemplated releases.

III. Description of the invention

Describe specifically what you consider to be your invention, as distinguished from the prior art. The description may reference a separate document (copy of a report, excerpt from a grant application, or the like) attached hereto. The description should include the following:

a. The problem solved by the invention? Proposes a mechanism for providing a service level mechanism for broadcasting negotiating system level parameters and information. Current mechanisms and protocols for system information broadcast are implemented in different wireless systems at the radio network layer, and do not carry information that can enable terminals to select wireless networks based on service level information.

b. The advantages of your invention over the prior work? Prior work allows the transfer of system information at the radio network level. As such, the amount of system information transmitted is limited. For example, service level parameters (services supported by the network, charging parameters, zone information, etc.) are typically not communicated. The

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Inventor (2)	Witness #2
Date:	Date:

present invention allows large and detailed amounts of system information to be transmitted, since the system information is transmitted at the IP-level. Secondly, transmitting system information at the radio network layer level makes it cumbersome to quickly change the system information. In other words, the scheme is not very flexible to accommodate dynamic system information. Since the present invention proposes to send system information at the IP layer, dynamic changes in the system information can be more easily accommodated. Hence, the terminal is able to apply knowledge of the network's service capabilities to the network selection/ reselection/ handover processes. Thirdly, in prior art, the transfer of system information is also unidirectional (network->terminal) in broadcast mode. This means that terminals are not able to negotiate parameters related to service operation, prior to selecting the network and establishing calls/ sessions. The present invention allows for two way communication at the system service level, so that system operation may be tailored to the user's needs. Fourthly, since the broadcast information is sent at the IP-level, it is easier to coordinate the exchange of system information among multiple systems. This was not possible in prior art.

c. The parts (steps) that make up the invention, in its best (preferred) form? See attached slides.

d. The parts that are new to this invention (in form or usage), and those that are old (conventional, used in the expected way)? The new parts are: (a) the use of a higher-layer (e.g. based on IP) mechanism to enable communication of system (service level) information; (b) enabling two-way communication on the system information plane, to allow negotiation of service level parameters; (c) the use of a generic IP-based system information protocol that works independent of the radio network layer (i.e. air interface).

e. The way the parts interact to make the invention work? See attached slides

f. Whether the part, (or its form or interconnection) is *ESSENTIAL* to the invention. For example, ask yourself, "If this part were left out, or changed, would the remaining device still be my invention?" Or, "If this part were changed or left out, would the invention still work? This may include any critical limitations such as angle, temperature, size, etc.Yes

g. Provide labeled sketches to detail your invention. Be sure all essential parts are shown on the sketch, and try not to include extraneous details. Measurements are not required, unless they are essential to the operation of the invention. See attached slides

IV. Background Information

a. What is the problem solved by your invention? See III a

b. How was the function of your invention performed by the prior work? Prior approaches support the broadcasting (unidirectional) of system information, at the radio network layer alone.

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Inventor (1):	Witness #1
Inventor (2)	Witness #2
Date:	Date:

c. What are the disadvantages of the prior work? They: (a) do not address service level information and parameters; (b) do not allow bidirectional communication of system information; (c) do not permit negotiation of parameters prior to cell/ network selection; and (d) are air interface specific, and do not work across air interfaces.

V. Prior Art

Attach a copy and citation of all publications, patents, etc. which are known to you, which relate to your invention, and which would be important to consider in understanding how your invention differs from prior work.

VI. Alternatives

You have described the best way to build (perform) your invention. Now consider the alternatives.

a. Is there any other way to perform your invention? Not apparent

b. In what ways could the parts (steps) be changed or equivalent parts substituted without changing the basic invention? Potentially the use of the mechanism with different core network architectures.

c. Is there a generic description for any of the parts you listed (i.e. "fastener" instead of "Machine Screw", or "plastic" instead of "polypropylene")? N/A

d. Could the functions of any of the parts be changed, combined, eliminated? N/A

e. What could be added to make the invention work better? N/A

f. What could be left out? N/A

Are you providing attachments with this disclosure ☒YES ☐NO

If you have any questions regarding this disclosure please contact:

Kimberly S. Chotkowski	Bob Paczulla
Patent Attorney	Patent Administrator
Tel. (610) 878-5621	Tel.(610)878-5678
FAX (610) 878-7844	Fax(610) 878-7844
e-mail: kimberly.chotkowski@interdigital.com	e-mail: robert.paczulla@interdigital.com

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Inventor (1):	Witness #1
Inventor (2)	Witness #2
Date:	Date:

Higher-Layer System Information for Wireless Systems

Narayan Menon, Prabhakar Chitrapu, Arty Chandra

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Problem Statement

- Current wireless architectures broadcast system information at lower levels (e.g. radio network layer)

- Information broadcast deals with over-the-air parameters, configuration, neighbor information, etc.

- System information thus broadcast does not include service level information, e.g.

  - Information on the network's service capabilities
  - List of services available, such as various types of multicast services
  - Billing/ charging related information
  - Security levels

- Current system information is also unidirectional (i.e. broadcast to terminals in coverage area)

  - Does not allow terminal-initiated interrogation or bidirectional negotiation

- Current mechanisms do not enable terminals to intelligently select networks based on service level information

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Proposed Solution

- A higher-level system information mechanism, e.g. at IP layer

  - Broadcast of system information to terminals, using IP

  - Bidirectional system information, allowing

    - Terminals to interrogate network on service capabilities

    - Terminal <-> network negotiation of service level capabilities and parameters of operation

  - System information can be specific to cell, Routing Area, Location Area, entire network (e.g. PLMN), etc.

  - The System Broadcast area can be dynamically changed

  - Generic protocol to work across different air interfaces

- Allows terminals to apply service level intelligence towards wireless network selection

- Allows network to intelligently implement user/ session level admission schemes

- Facilitates intelligent network selection/ reselection/ handover in a multi air interface configuration, e.g.
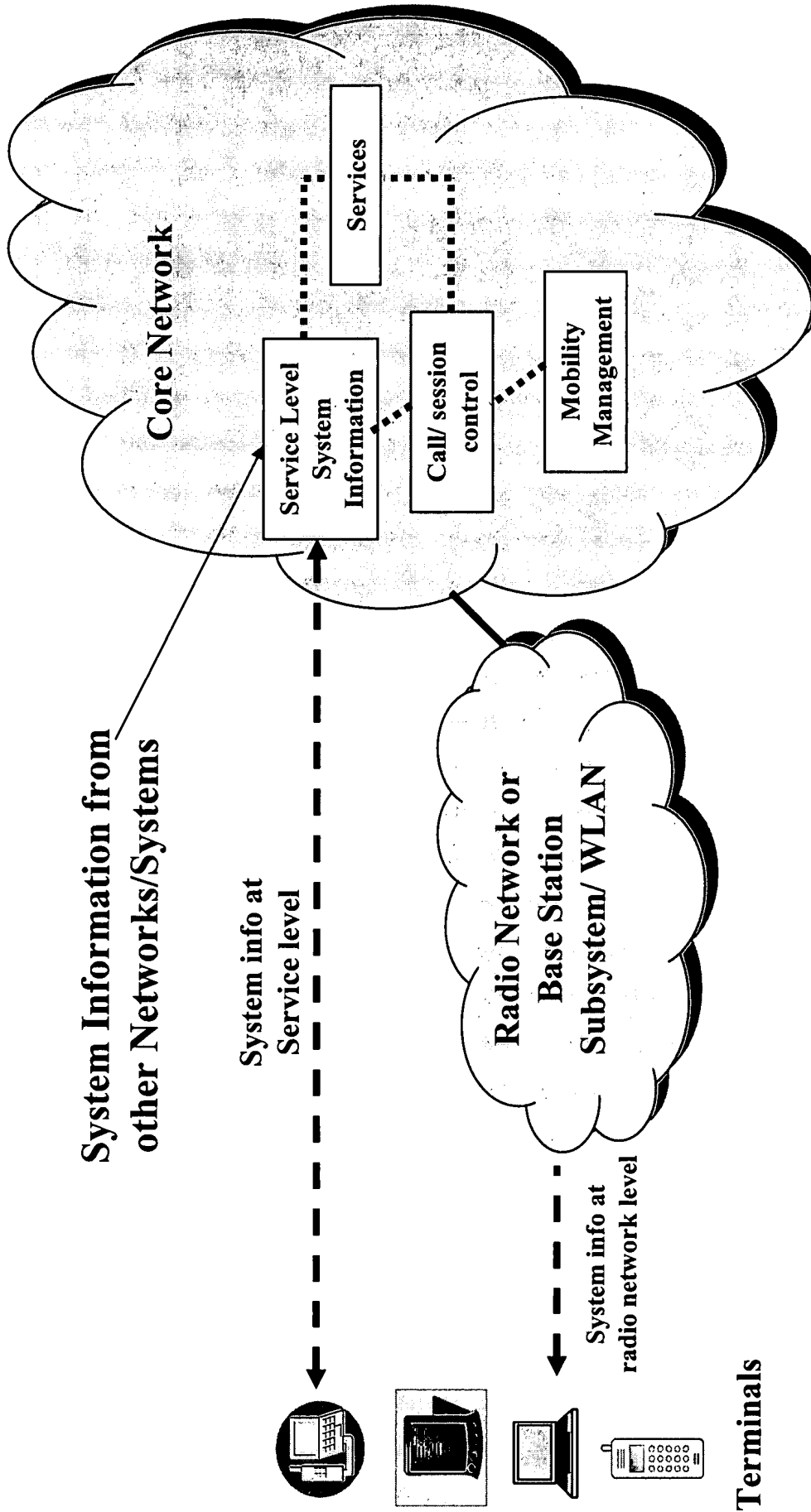
  - UMTS <-> WLAN

Rich System Information

- Radio (RF) parameters

- Neighbor Cell, Neighbor Network/System details

- Geo-locations of current and neighbor cells/Networks/Systems

- Specification of current system area, in terms of cell IDs or Geo-coordinates.

- Details of Bearer services available and Bearer capabilities

- Details of Billing and Charging information

- Details of Levels of Security

- List of Services available, including various multicast services such as Weather, Stock quotes, sports event results etc etc

- Details of Network Status, including levels of Congestion, availability of Radio and Network Resources etc

Architecture

Core Network

- Services
- Service Level System Information
- Call/ session control
- Mobility Management

System Information from other Networks/Systems

System info at Service level

Radio Network or Base Station Subsystem/ WLAN

System info at radio network level

Terminals

- Service level system information
- Bidirectional exchange
- Allows negotiation

System information, can be transmitted exclusively at the IP-level or at both IP-level and radio network level with some redundancy of system information

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Potential Claims

- Broadcast channel at IP-level

- Broadcast service level information in the Broadcast channel, for example,
  - Available multicast services

- Broadcast network status information in the Broadcast channel, for example,
  - Network congestion state
  - Availability of network resources

- Broadcast information about locations of adjacent cells
  - Location could be specified in terms of Geo-coordinates, or relative distances or map-based

- Broadcast information about adjacent, but different, networks
  - Examples of different networks are (UMTS, WLAN), (UMTS, CDMA2000) etc
  - Example: UMTS broadcast channel transmits information indicating that there is a neighboring WLAN (which could be used for handover)

- Broadcast information about distant, but different, networks
  - Example: UMTS broadcast channel transmits information indicating that there is a WLAN about 1 mile away or at certain geo-location (which could be used predicting or anticipating a handover)

- A scheme for a user to negotiate handover related parameters/profiles with System-A, when the user is camped on System-B, and with the user using radio channels of System-B.

- 2-way negotiation before switching over

- Potential to broadcast the system information to a wireline-attached user, i.e. a terminal that is currently not attached to a wireless system van receive system information on available wireless networks in the vicinity, and can use the information to decide whether to attach wirelessly or not